

ITS Data

Data Fusion/Warehousing Concepts and Benefits

By

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Overview

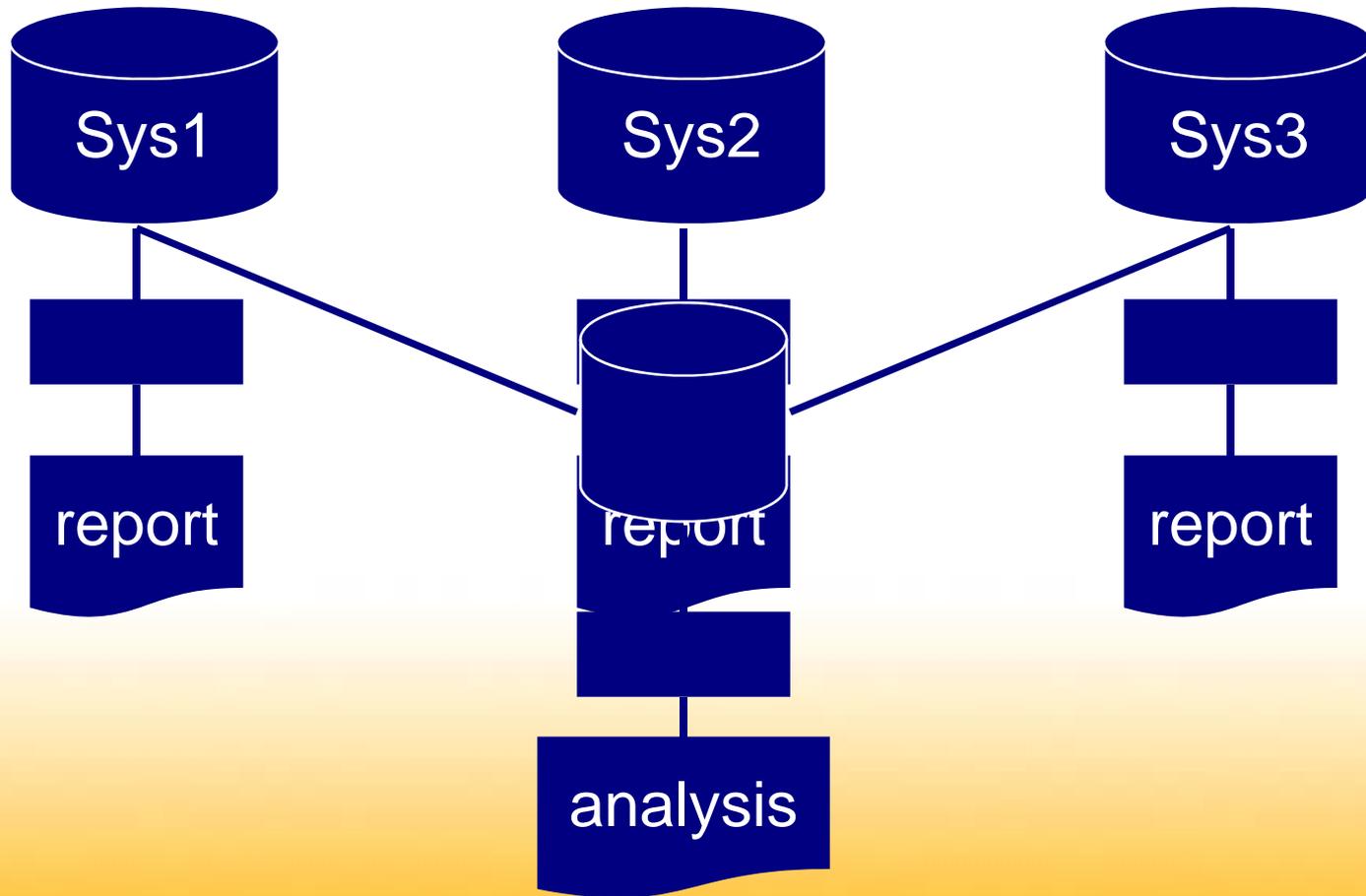
Intelligent Transportation Systems consume and generate huge amounts of valuable data. Current technologies have the capability to store and process this data, and combine many sources of data.

This wealth and fusion of data allows analysis beyond simple system reports, and can change the approach to the planning process.

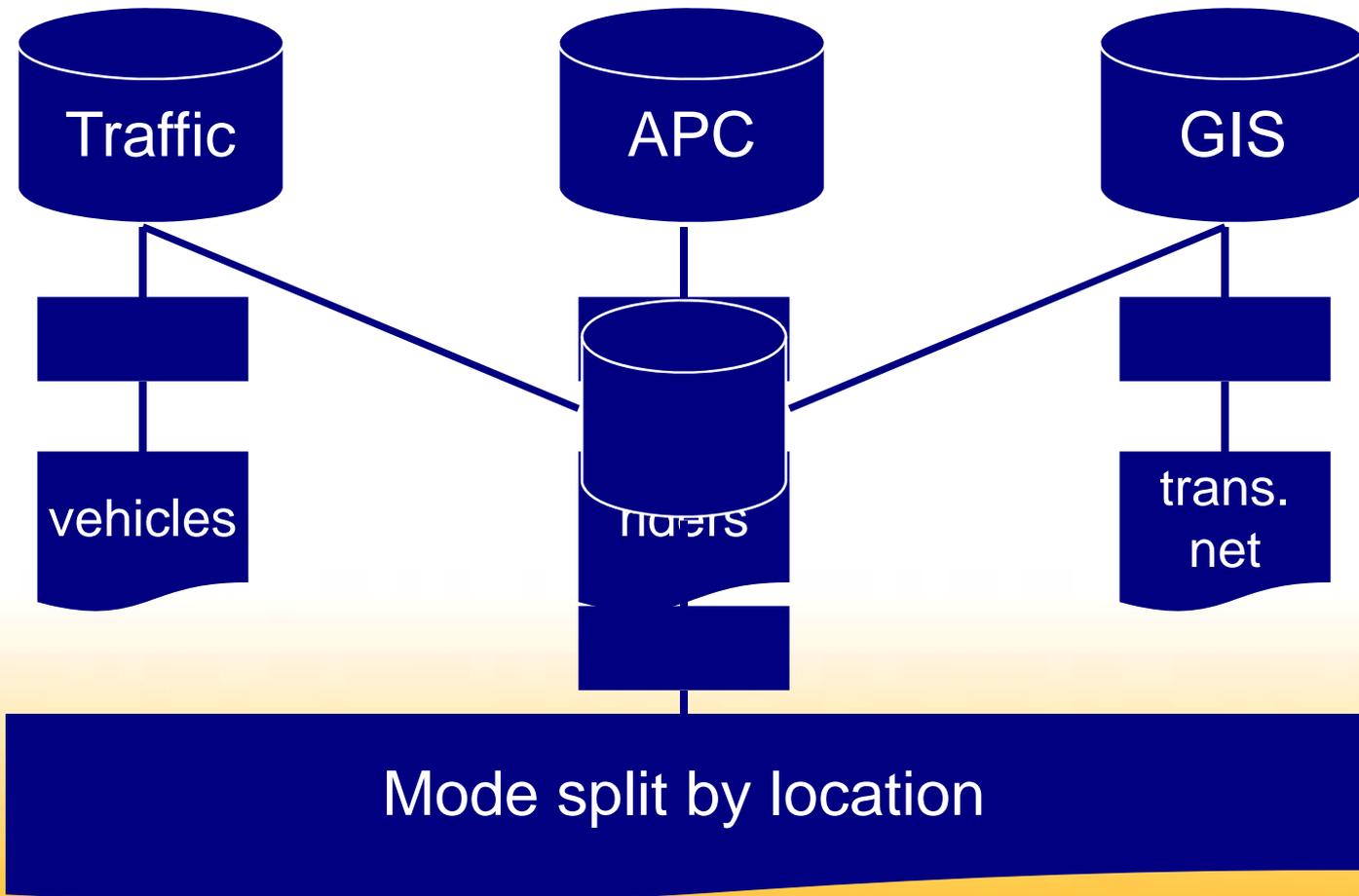
Overview

- Data Fusion Concept
- Technology
- Integration
- Data Fusion Example
- Final Thoughts

Data Fusion Concept



Data Fusion Concept



Data Technology

Computing power and data storage capacity has increased exponentially over the course of current transportation professionals' careers.

- Consumer Terabyte drives <\$200
- Moore's law: double processor capability every two years. Ten years in industry = 32 times power.
- Network communication has increased 20,000 times.

Data Technology

Computing power and data storage capacity has increased exponentially over the course of current transportation professionals' careers.

- Years of data can be stored online.
No need to archive.
- Months of system-wide data can be analyzed in minutes.
- Data can be exchanged between systems in real-time.

Data Integration

To successfully and accurately combine multiple data sources, they must be relatable.

- Common keys/IDs
- Consistent data types (text/number, time)
- Common framework such as GIS

This can be achieved in one or more of three ways:

Three ways to successfully integrate datasets:

Standards

Thoughtful data model design

Sheer will and creativity

Data Fusion Example

KC Metro SandRA database

- **TNET: Transportation Network**
GIS database of streets, routes, stops, time points and other transit features.
- **TED: Transit Enterprise Database**
Schedule data interfacing TNET and HASTUS.
- **AVL: Automatic Vehicle Location**
Fleet-wide log of time point arrivals.
- **APC: Automatic Passenger Counter**
Directed sample of all service per service change. Approximately 12% of the fleet is equipped.
- **TSP: Transit Signal Priority**
RF Tag and TSP results logs at ~100 intersections.
- **Traffic Signal Logs**
TSP requests and actual benefit.

Data Fusion Example

KC Metro SandRA database

Goals

- Analyze transit data based on the transportation infrastructure, not route maps.
- Combine multiple legacy data systems.
- Simplify complex analysis tasks.

Data Fusion Example

KC Metro SandRA database

Approach

- Develop a common data model of the transportation network normalizing data to the street level.
- Build database links that transform data into common data types and units.
- Pre-process relationships and complex math to reduce most analysis tasks to simple metrics (i.e. sum, average, max).

Data Fusion Example

KC Metro SandRA database

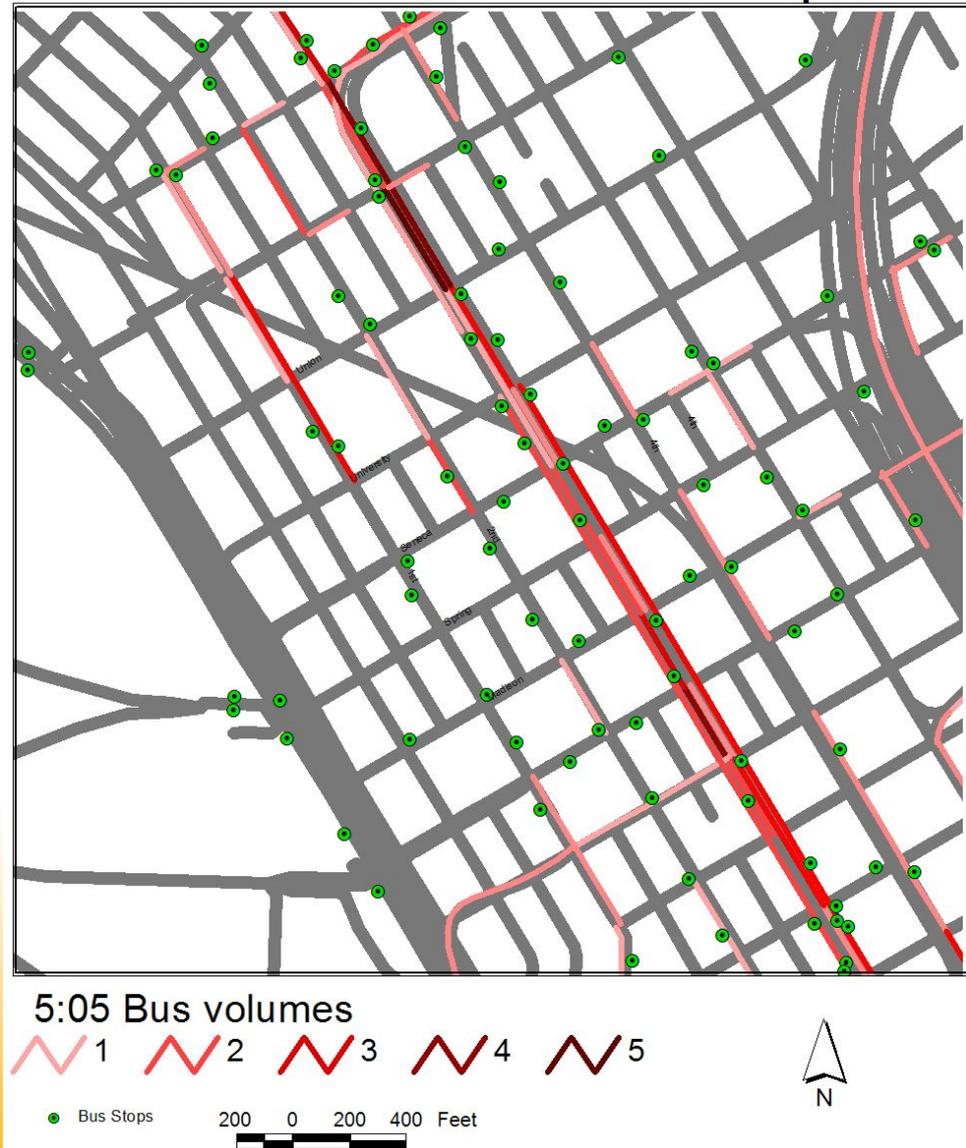
Analysis possible through SandRA

- Corridor travel speed and reliability.
- System wide search for schedule congestion points.
- Locate sources of schedule delay.
- Infrastructure capacity usage.

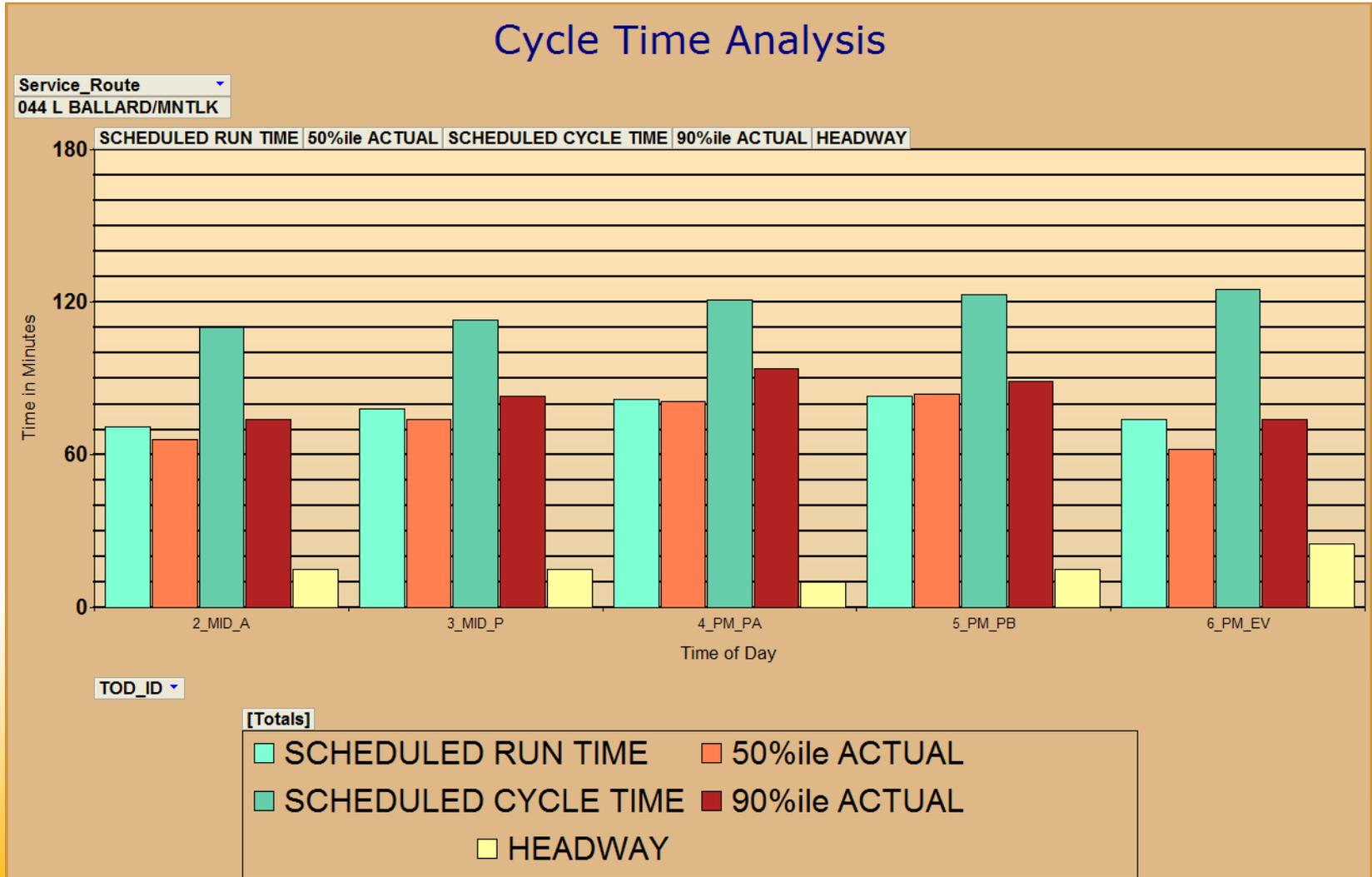
Example Bus Volume Snapshot

This is the number of buses scheduled to be on each street at 5:05 pm. Note that two are in the zone and one approaching 2nd/University. There are 4 northbound and 5 southbound at 3rd/Pike.

CBD Bus Volumes -- 5:05 pm



Example: Cycle-time Analysis



Final Thoughts

- Data fusion improves the quality and quantity of analysis.
- Processing and storage technologies are powerful and affordable.
- Many ways to integrate data.
- Good access to data makes planning more efficient.

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